DOCUMENT RESUME

ED 382 030 FL 022 945

AUTHOR	Dalton, Stephanie; Sison, June
TITLE	Enacting Instructional Conversation with Spanish-Speaking Students in Middle School Mathematics. Research Report 12.
INSTITUTION	National Center for Research on Cultural Diversity and Second Language Learning, Santa Cruz, CA.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	95
CONTRACT	R117G10022
NOTE	28p.
AVAILABLE FROM	NCRCDSLL/CAL, Dissemination Coordinator, 1118 22nd St., N.W., Washington, DC 20037.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Classroom Environment; Discourse Analysis; *English (Second Language); Grade 7; Hispanic Americans; Junior High Schools; Junior High School Students; *Mathematics Instruction; Middle Schools; Second Language Learning; *Spanish Speaking; *Student Participation; Teaching Methods; Visual Aids
IDENTIFIERS	Content Area Teaching; *Conversation; Hispanic American Students; Language Minorities; *Middle School Students

ABSTRACT

The plight of students learning language simultaneously with content material, particularly math, spurred this study of the power of socioculturally based pedagogy, such as Instructional Conversation (IC), to increase Spanish-speaking minority students' acquisition of English math lexicon and concepts. This article describes a series of four ICs taught by a novice teacher. The ICs were designed to promote interaction about math concepts in small groups of seventh grade students who were ordinarily excluded from classroom participation by their regular teacher. In keeping with sociocultural theory, The IC teacher assisted students' conversation on math using visual stimuli, joint productive activity, and teaching that regularly urged students toward language expression on math topics. After describing the features of IC pedagogy, this paper analyzes the transcripts of the ICs using quantitative and discourse analysis. Measures of teacher and student percentages of talk, use of content lexicon, and appropriacy of student talk were obtained. Results indicated that all the students participated comfortably in academic conversation using math lexicon with increasing appropriacy and focus. Intersubjectivity emerged in the conversations and was apparently built on the students' and teacher's similar and shared experience in constructive social interaction about math. Students' participation in IC increased dramatically and stabilized across the four ICs, indicating the usefulness of this pedagogy to include often excluded language minority students in classroom interaction. Contains 28 references. (Author)

RESEARCH REPORT: 12

ED 382 030

ENACTING INSTRUCTIONAL CONVERSATION WITH SPANISH-SPEAKING STUDENTS IN MIDDLE SCHOOL MATHEMATICS

STEPHANIE DALTON AND JUNE SISON

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

- This document has been reproduced as received from the person or organization originating it.
- ☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

BEST COPY AVAILABLE

Enacting Instructional Conversation with Spanish-Speaking Students in Middle School Mathematics

STEPHANIE DALTON AND JUNE SISON
UNIVERSITY OF CALIFORNIA, SANTA CRUZ

NATIONAL CENTER FOR RESEARCH ON CULTURAL DIVERSITY AND
SECOND LANGUAGE LEARNING

1995

Research Report No. 12

Editorial/production supervision: Jeanne Rennie

Production: Guadalupe Hernández-Silva

Cover and interior design: Drews & Row, Inc.

This report was prepared with funding from the Office of Educational Research and Improvement (OERI) of the U.S. Department of Education, under Cooperative Agreement No. R117G10022. The findings and opinions expressed here are those of the authors and do not necessarily reflect the positions or policies of OERI.

© 1995 by the National Center for Research on Cultural Diversity and Second Language Learning, University of California, Santa Cruz

All inquiries should be addressed to Dissemination Coordinator, NCRCDSLL/CAL, 1118 22nd Street NW, Washington, DC 20037.

National Center for Research on Cultural Diversity and Second Language Learning

The National Center for Research on Cultural Diversity and Second Language Learning is funded by the Office of Educational Research and Improvement of the U.S. Department of Education to conduct research on the education of language minority students in the United States. The Center is operated by the University of California, Santa Cruz, through the University of California's statewide Linguistic Minority Research Project, in collaboration with a number of other institutions nationwide.

The Center is committed to promoting the intellectual development, literacy, and thoughtful citizenship of language minority students and to increasing appreciation of the cultural and linguistic diversity of the American people. Center researchers from a variety of disciplines are conducting studies across the country with participants from a wide range of language minority groups in pre-kindergarten through Grade 12 classrooms. Research projects deal with the relationship between first and second language learning; the relationship between cultural and linguistic factors in the achievement of literacy; teaching strategies to help children from diverse linguistic and cultural backgrounds gain access to content material; alternate models of assessment for language minority students; various instructional models for language minority children; and the effect of modifications in the social organization of schools on the academic performance of students from diverse backgrounds.

Dissemination is a key feature of Center activities. Information on Center research is published in two series of reports. *Research Reports* describe ongoing research or present the results of completed research projects. They are written primarily for researchers studying various aspects of the education of language minority students. *Educational Practice Reports* discuss research findings and their practical application in classroom settings. They are designed primarily for teachers, administrators, and policy makers responsible for the education of students from diverse linguistic and cultural backgrounds.

For more information about individual research projects or to have your name added to the mailing list, please contact:

Barry McLaughlin, Director
National Center for Research on Cultural Diversity
and Second Language Learning
141 Kerr Hall
University of California
Santa Cruz, CA 95064

COLLABORATING INSTITUTIONS

University of California
Santa Cruz

University of California
Irvine

University of California
Los Angeles

University of California
San Diego

University of California
Santa Barbara

University of Arizona
Tucson

University of Southern California
Los Angeles

Center for Applied Linguistics
Washington, DC

Technical Education Research Center
Cambridge, MA

Acknowledgments

This study was supported by the National Center for Research on Cultural Diversity and Second Language Learning. As part of their research activities, National Center Principal Investigators Ronald Henderson and Edward Landesman generously provided the venue for this study in their project, "Role of Instrumental/Social Competence in Development of Higher Order Cognitive Processes in Mathematics in Language Minority Students." We also thank Kathy Ponce and Phoumy Sayavong for their help preparing and coding data.

Enacting Instructional Conversation with Spanish-Speaking Students in Middle School Mathematics

Abstract

The plight of students learning language simultaneously with content material, particularly math, spurred this study of the power of socioculturally based pedagogy, such as Instructional Conversation (IC), to increase Spanish-speaking minority students' acquisition of English math lexicon and concepts. This article describes a series of four ICs taught by a novice teacher. The ICs were designed to promote interaction about math concepts in small groups of seventh-grade students who were ordinarily excluded from classroom participation by their regular teacher. In keeping with sociocultural theory, the IC teacher assisted students' conversation on math topics using visual stimuli, joint productive activity, and teaching that regularly urged students toward language expression on math topics. After describing the features of IC pedagogy, this paper analyzes the transcripts of the ICs using quantitative and discourse analysis. Measures of teacher and student percentages of talk, use of content lexicon, and appropriacy of student talk were obtained. Results indicated that all the students participated comfortably in academic conversation using math lexicon with increasing appropriacy and focus. Intersubjectivity emerged in the conversations and was apparently built on the students' and teacher's similar and shared experience in constructive social interaction about math. Students' participation in IC increased dramatically and stabilized across the four ICs, indicating the usefulness of this pedagogy to include often excluded language minority students in classroom interaction.

INTRODUCTION

When students from non-majority backgrounds enter school, they often encounter teachers from cultures different from their own. Cultural differences in the classroom can lead to misunderstandings and invalid inferences about students' prior knowledge and capacity for learning. This, in turn, reduces interactive instruction from teachers, further compounding language minority students' difficulties by postponing their mastery of language, conversational conventions, and academic content (Au, 1980; Mohatt & Erickson, 1980; Rosebery, Warren, & Conant, 1992). In mathematics, for example, instruction for language minority students is often limited to skill drill exercises lacking context and problem-solving focus (Secada, 1991). Duran (in press) reports that College Board Scholastic Aptitute Test-Mathematics (SAT-M) scores for Latino students have shown little increase since information on the ethnic/racial identity of test-takers was first recorded in 1976. Likewise in reading and other content areas, scant progress is reported for Latino students.

Direct classroom observations indicate that teachers talk twice as much as students, and that more than half of students' interactions are listening or other non-verbal gestures (Ramirez, Yuen, & Ramey, 1991). Assumptions about the need to be English-proficient and to learn basic skills before problem-solving skills appear to result in instruction that neglects language development, interaction on strategies and academic topics, and teaching for higher order thinking. Not only does this further reduce opportunities for academic achievement, but—particularly in middle school and high school—language minority students' exclusion and limited achievement often result in their developing low self-concepts and little belief in their own ability to learn (Padron, 1992).

From research, theory, and practice perspectives, it is possible to change this dismal scenario. Language minority students' performance does improve when instruction directly addresses their language and learning needs. Sensitizing the language of content instruction to the language needs of diverse students improves second language and content concept acquisition (Spanos, 1990). Instructional practices that relate students' prior experiences to academic content and embed basic skills instruction in thematic contexts increase academic success (Allington, 1990; Chamot, 1992; Means & Knapp, 1991). Directly coaching unsuccessful students in the use of learning and problem-solving strategies in reading comprehension has been successful for second language learners (Chamot, 1992; O'Malley, Chamot, Strewner-Manzanares, Russo, & Kupper, 1985; Palinscar & Brown, 1984; Raphael, 1985; Silver & Marshall, 1990).

Instructional practices growing from a social constructivist view of learning, in which knowledge is to some extent created by individual learners as active processors of new information (Chamot, Dale, O'Malley, & Spanos, 1992), have produced gains for language minority students. For example, in mathematics the first step in problem solving is to produce an understanding or a representation of the problem. Social constructivist instruction often proceeds by assisting students to make a problem meaningful by relating it to students' experience and knowledge. Teachers guide students to activate prior knowledge by having them make predictions, participate in experience-based discussions, and hypothesize. The learner gradually constructs increasingly stable problem representations until one is adequate to use for the problem solution (Polya, 1973; Silver & Marshall, 1990). Students solving problems cooperatively model strategies openly and support one another to construct accurate problem representations and practice problem solutions (Chamot, Dale, O'Malley, & Spanos, 1992).

Among the most promising approaches in contemporary educational theory is the sociocultural perspective, in which the view that knowledge is socially constructed is further developed and expanded. The purpose of this paper is to explore the potential of socioculturally based pedagogy, particularly the Instructional Conversation (IC), to increase the participation in teaching and learning activities of

both teachers and their language minority students. This approach appears to have significant potential to advance, simultaneously, the learning of academic content concepts and development in the language of instruction per se. This is because instructional practices based on sociocultural theory emphasize activity and the simultaneous communication of the meaning of the activity through language. Language's basic function is sociocultural: to reflect speaker identity and attitudes. Timing and tone of delivery, in spoken language, are critical for promoting or impeding teaching and learning regardless of the overall quality of instruction (Cazden, 1986). In activity, and in the language that accompanies and describes it, students attend to the use of specialized language or lexicon to communicate ideas and to the means for expressing understanding about ideas, concepts, and relationships among concepts.

Cazden (1986) refers to intellectually valuable forms of specialized language or lexicon used in instruction as having a sociocultural or a conceptual function. The teacher's use of specialized language identifies the teacher's role–the sociocultural function–and distinguishes content-specific topics–the conceptual function. Students' use of lexicon has, first, a sociocultural function, and as students become able to use the terms, a conceptual one. Cazden reports that it is difficult to distinguish between the two functions, because in both students' use and teachers' use, the communication is likely to be dual.

The reports we have about language minority students striving to learn, simultaneously, both everyday conversation and the academic language of content areas in English, indicate that academic gain (content language, concepts, and lexicon) requires considerably more time to develop than does everyday language proficiency (Chamot & O'Malley, 1989; Collier, 1987). Language minority students who lack experience in classroom social interaction are less likely to know sociocultural and conceptual language functions. They are also less likely to understand rules (both implicit and explicit) of successful participation or strategies for achieving lesson goals. Thus excluded from interactive instruction, these students are unable to participate in the activity and language that build common understandings, self-esteem, and shared perspectives. In effective classrooms, the shared perspectives of intersubjectivity reflect an evolving convergence in individuals' points of view, and this convergence increases choices and actions that reflect shared meaning, socioculturally and conceptually (Erickson, 1986). Instruction of language minority students must not exclude them from these opportunities to develop shared perspectives, but must emphasize self-concept and skill in conversation and activity. This is crucial for second language learners, who are culturally and linguistically different from their majority peers and have already experienced exclusion (Padron, 1992).

Inclusion is a defining characteristic of socioculturally based pedagogy. Sociocultural theory advances the notion of knowledge construction particularly as it is co-constructive, that is, as it is assisted through participation in language and activity (Vygotsky, 1978). Teachers and competent others (such as fellow students, aides, or parents) guide learners through their zones of proximal development (ZPD) by offering assistance at the points it is needed (Tharp & Gallimore, 1989). In this view, teaching occurs when it aims to assist emerging understanding that occurs in learners' ZPD. The notion of teaching as assistance challenges traditional models of teaching and learning and encourages experimentation in innovative approaches.

Socioculturally based pedagogy, with its emphases on language, activity, and assistance, has promise for increasing students' achievement and supporting students' affective needs (Rueda & Garcia, 1992). One socioculturally based pedagogical approach, Instructional Conversation (IC), has been described by Tharp and Gallimore (1989), Goldenberg (1991, 1993), Rueda, Goldenberg, and Gallimore (1992), and Echevarría and McDonough (1993). IC is most often enacted in a small group using familiar forms of conversation to assist students' language production and understanding. Teachers using IC take advantage of ordinary conversation about an interesting stimulus or activity to entice students to

use social and academic language and to share prior knowledge. In the interaction, teachers ascertain levels of students' independence and needed assistance (Gallimore, Dalton, & Tharp, 1986). In IC, teachers probe to obtain information about students' zones of proximal development. Thus, the format of an IC, from the outset, is not strictly prescribed nor pre-scripted, but reflects a plan (including anticipated options and some unanticipated ones) to achieve selected outcomes. Outcomes are proximal in obtaining information about students' prior knowledge and their ZPDs, and distal for assisting students' understanding and knowledge construction.

INSTRUCTIONAL CONVERSATION (IC)

Instructional Conversation (IC) imbeds teaching activity in the exchange of ordinary social interaction. When skillful teachers enact IC, conversation with students appears fluent and natural, shifting from social and everyday topics to instructional topics that require complex analyses and language use. Such versatile use of conversation and instruction is, in fact, based on a general plan to achieve student outcomes and on an intention to excite students' participation. Conversation complements instruction when it produces inclusive and responsive interaction and the opportunity to assess and assist students' understanding. Indeed, the complementary faces of IC, instruction and conversation, can be described as an infrastructure that supports and guides the participants in their interactive quest to make meaning and co-construct new understanding.

INSTRUCTIONAL <> CONVERSATION

OUTCOMES-BASED <> INCLUSIVE

ASSESSMENT <> RESPONSIVE

ASSISTANCE <> JOINT PARTICIPATION

CO-CONSTRUCTED KNOWLEDGE

First, consider the conversational face of IC. This face looks for *inclusiveness* using familiar, interesting topics, some of which are student selected to encourage interaction. Because students' utterances are not entirely predictable, teachers are *responsive* to students' contributions, combining them to intensify interest and focusing on the ways they contribute to meaning making. In conversation, *joint participation* structures emerge or are negotiated to respond to students' interaction preferences. Examples of these participation structures include forms of turn taking, such as volunteering without hand-raising; respect for rhythms of students' conversation, for example, increasing wait time or attending to simultaneous and co-narrated talk; and achieving balance in students' and teachers' topic selection and development in the conversation.

IC's other face is instructional, having *intended outcomes* such as particular concept or content understanding. Teachers invite students to participate from personal experience to develop a topic or influence the direction of conversation. Such interaction provides information about students' language proficiency and content understanding. This opportunity to *assess* students' independence and learning needs offers teachers a basis for judging how to *assist* students at appropriate points in their ZPDs. In other words, teachers plan IC's general direction, anticipate student contributions that will expand conversation, and prepare to be responsive to unexpected student contributions. Thus, IC offers an occasion for authentic assessment, providing a baseline for students' current levels of understanding. Assessing is a continuous function in IC; supporting and validating the effects of student assistance. In IC, teachers assist students in their ZPD to accomplish *co-constructed knowledge*, that is, increased teacher and student understandings in relation to IC's instructional and conversational outcomes.

In this study, we were interested in how IC encourages productive social interaction on mathematics topics in seventh grade with Spanish-speaking language minority students. We describe one teacher's use of IC in instruction designed to develop,

simultaneously, students' everyday and academic use of the language of instruction (English), mathematics concepts, and self-concept.

PURPOSE OF THE STUDY

This study examined a series of four Instructional Conversation (IC) lessons in seventh grade math, enacted by a novice teacher, with Spanish-speaking minority students. The analysis focused on three questions: (1) To what extent did the teacher enact IC in math to create an inclusive and student-enhancing learning context ? (2) To what extent did students use content lexicon in the ICs? (3) To what extent did students acquire the math concepts taught in these lessons? To explore these questions, the transcripts of the four lessons, taught over a two-month period, were analyzed. Quantitative analyses were performed for all the lessons on the following variables: 1) students' and teacher's talk turns, 2) teacher's use of content lexicon, 3) students' use of content lexicon, and 4) students' appropriate utterances. A discourse analysis was then used to explore changes in the quality of the lessons from the first through the fourth.

METHOD

Setting

The students who participated in this research attended a California middle school serving a population predominantly of Mexican descent. The school is located in a community that depends heavily on an agricultural economic base. This community, like others in the state, has a history of attempting to serve students of Mexican descent, but as the proportion of Mexican-descent students within California has increased dramatically in a short period of time, their students continue to be disproportionately represented among low achievers (Henderson, 1992).

Subjects

The six students participating in the lessons were seventh-grade Spanish-language minority students all classified as low achievers. The students were assigned to an English-only (EO) classroom. The classroom teacher selected the students who participated in these lessons as those most needful of help in math. She described them as "unteachable." At least three of the six students had gang-related histories. Their attendance was erratic; only three of the six appear in all four lessons.

The IC teacher, this paper's second author, was a graduate student in education who wanted to practice using new pedagogy in mathematics with language minority students. She is monolingual in English and her area of expertise is mathematics education. Her enactment of IC was guided by course work in mathematics education and by her own system of values and beliefs about assisting student learning. She was assisted in planning and reflecting about the lessons by a teacher educator experienced in the use of IC (first author).

Procedure

The novice teacher taught four IC lessons on the math concepts of circumference and diameter to a group of 4 to 6 seventh-grade students. She made arrangements with the regular teacher to meet with the students in a corner of the classroom during regular classtime. Each IC was videotaped and later transcribed. The lessons were taught over a period of two months. Lessons 1, 3, and 4 lasted approximately 20 minutes; Lesson 2 lasted approximately 40 minutes.

Analysis

The four lesson transcripts were coded for students' and teacher's talk turns, teacher's use of content lexicon, students' use of content lexicon, and students' appropriate utterances during the IC. The transcripts were coded by three reviewers who met to compare coding results. Disagreements in coding were resolved through discussion.

To code student and teacher talk turns, every utterance–completed or incompleted–identified by

participant's name on the transcripts was counted. Nods and headshakes notated by participant's name were counted the same as utterances meaning yes or no. Other expressions, such as "oh," "umm," and "so" were also counted as utterances constituting turns. A single word or less or a head nod was accepted as valid participation in the conversation as it is in informal conversation.

The teacher's and students' use of content lexicon throughout the four lessons was counted. The math content words were identified as those that were subject specific and explicitly explained in the IC: center, chord, circle, circumference, degree, diameter, estimate, line, math, measure, point, radius, and square.

To be coded as appropriate, a student's utterance had to be related to the active topic of group conversation, revealed to be related by subsequent or earlier utterances, or contextualized through co-narration, where students build on one another's statements to make a meaningful point. The utterance also had to represent a reasonable attempt to contribute to the topic of conversation. A student's statement of "I don't know" represented a report of the absence of student knowledge about the topic and was coded as an appropriate, topic-related response. Differences in coding were resolved first by referring to the teacher's prompts and context of conversation as guides for judging appropriateness, and second, by discussion among coders.

The quantitative results of transcript coding are presented in the following section.

RESULTS

The following results focus on students' attendance patterns, students' and teacher's percentage of talk turns, frequency counts of teacher's and students' use of content lexicon, and students' use of appropriate and inappropriate utterances during the four ICs. Qualitative results examining student and teacher discourse in the four ICs will be presented in the discussion section.

Student Attendance

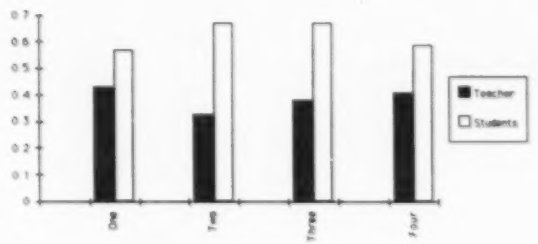
The six students participating in this study had irregular attendance patterns. One student, Adam, was present for only one IC–the first. Another student, Adrianna, was present for two ICs–the second and third. A third student, Edgar, was present for three ICs–the first, second, and fourth. The remaining three students, Concha, Daniel, and Luis, were present for all four ICs.

Teacher Student Percentage of Talk (TSPOT)

The teacher/student percentage of talk (TSPOT) indicates that the IC lessons did encourage students to talk. The counts were based simply on the number of student and teacher turns. The teacher percentage of turns (TPOT) was well below 50% of total talk turns, with the student percentage of turns (SPOT) at more than 50% (see Table 1).

TABLE 1

TOTAL TEACHER/STUDENT PERCENTAGE OF TALK (TSPOT)



The level of total student talk was higher than the level of teacher talk in each lesson. The range of total student turns, SPOT, was 10 percentage points (from 57% to 67%); the range for TPOT was also 10 percentage points (from 33% to 43%). The teacher's turns were the highest in the first IC, dropped the most in the second IC, and leveled off at 38% to 40% in the third and fourth ICs. To view individual student

TABLE 2

TEACHER AND STUDENT PERCENTAGE OF TALK
(TSPOT)

IC Lesson	Teacher	Adam	Adrianna	Concha	Daniel	Edgar	Luis	Total Students
One	43%	absent	absent	4%	10%	18%	25%	57%
Two	34%	absent	15%	12%	5%	19%	15%	66%
Three	38%	4%	16%	11%	18%	absent	13%	62%
Four	40%	absent	absent	16%	17%	18%	9%	60%

participation, a turn count was done for each lesson participant. Table 2 presents the percentage of talk for the teacher and for each student for each lesson.

SPOTs were lowest in the first IC, increased in the second IC, and leveled off in the third and fourth ICs. Of the four students present for the first and fourth ICs, two increased their participation: Concha's proportion of talk turns quadrupled, and Daniel's proportion increased by more than one and a half times. Edgar's talk turns remained the same, and Luis's fell by more than half his contribution in the first lesson. In the first IC, individual SPOTs varied by 21 percentage points. By the fourth IC, the range had narrowed to 9 percentage points. This strongly suggests an increase in students' comfort and skill in conversation; they were getting better at joining the give and take of IC by the fourth experience.

In the fourth IC, the similar level of Concha's, Daniel's, and Edgar's SPOTs contrasts with Luis's SPOT, which is about half the level of the others. Luis's SPOT is also just over one third the level of his SPOT in the first lesson. Such a change indicates that a shift in the balance of talk turns has occurred from the first to the fourth IC. This, in addition to the narrowed range in levels of participation, indicates that the ICs were inclusive, encouraging students to use language for its sociocultural function, that is, to develop students' identity as math students.

This analysis shows that the language opportunities provided by the teacher were productive. The following analyses will examine other factors affecting students' participation and the meaning of student talk.

Teacher's and Students' Use of Content Lexicon

The number of content lexicon items used by the teacher and students in the lessons is listed in Table 3 by frequency of teacher and student use. The frequency counts show that students were using more content lexicon in the third and fourth ICs than in the first and second. From six instances of content lexicon in the first IC, the students increased their use by eight times, to 48 instances.

TABLE 3

TEACHER AND STUDENT USE OF
CONTENT LEXICON

IC Lesson	Teacher	Students
One	28	6
Two	72	22
Three	73	49
Four	85	48

This increase in students' use of content lexicon strongly supports the previous finding that students used language in the IC as a sociocultural function and, in that use, came to distinguish specific content topics. Given the large increase in content lexicon use, it is likely that the students grasped the conceptual function of the terms.

Students' Appropriate Utterances

As Table 4 displays, the highest proportion of students' appropriate utterances occurred in the fourth IC, with the next highest proportion occurring in the first IC. The third IC figures indicate that

students were increasingly engaging in IC themes, and the fourth IC figures attest to a conversation predominantly addressing IC themes.

TABLE 4

STUDENTS' APPROPRIATE AND INAPPROPRIATE UTTERANCES

IC Lesson	Appropriate	Inappropriate
One	88%	12%
Two	38%	62%
Three	73%	27%
Four	96%	4%

As the following qualitative analysis discusses, the early phase of IC, such as that of the first IC lesson here, is typically characterized by an experience-based conversation, only generally related to intended IC outcomes. In this phase, teachers discover what students know that teachers don't by inquiring about it and listening to students. This would vary, of course, from group to group, depending on teachers' and students' familiarity with each other, with conversation, and with the subject matter. The figures for the first IC show student talk was occurring at a moderately high level (more than 50% of the total talk), with little use of content lexicon, and the majority of responses were appropropriate. These indices suggest that the conversation was indeed wide-ranging and engaging for students. They also suggest that the teacher was guiding the topic and that conversation revolved around topics selected by the teacher or by the teacher and students together.

The second IC was coded as having a high proportion of students' inappropriate utterances. The lowest percentage of teacher talk was coded for the second IC, suggesting that the teacher continued to work the IC theme with the students and did not address the students' inappropriate utterances. The lowest teacher talk percentage and highest students' inappropriate utterances means the teacher had little opportunity to engage students on intended IC themes.

The figures for the third and fourth ICs attest to a growing competency on the part of the students and teacher in IC. They suggest that the group has acquired a shared interpretation of the event through these four experiences and that the participants cooperate at high levels to perform IC.

DISCUSSION

The results presented in the preceding section demonstrate that students' participation in the third and fourth ICs was different from that of the first two ICs on all indices: frequency of students' use of content lexicon, opportunity for student talk, and appropriateness of students' talk. These are informative indices, but they do not explain specifically what has changed in the lesson conversations or why change occurred.

This section uses a discourse perspective to explore changes in the lessons' conversations. Each of the four ICs is described briefly. Because the quantitative data indicated that the fourth IC stabilized the gains appearing in the third IC for teacher and students' ratio of talk, students' use of lexicon, and level of appropriateness of students' utterances, that lesson is the main focus of our discourse analysis.

The following analysis explores the discourse strategies in IC that the teacher used to include all the students, to create a positive context for participation, and to assist students to use content lexicon and concepts appropriately. The analysis focuses on ways the students used content lexicon in the IC indicating that they understood the terms and grasped the concepts they represented.

First IC Lesson

In the first IC, the quantitative results show that four students participated constructively, at talk levels ranging from 4% to 25% . Students' total talk comprised more than half of the conversation, and students used little content lexicon. What meaning do these indicators have for the use of IC pedagogy? How did students talk about math topics and concepts? How did the teacher use IC to encourage

students' language expression, scaffold students' learning, and achieve lesson goals? This section examines the IC discourse strategies the teacher and students enacted to focus on math concepts and their meaning.

The numerical results for STPOT in the first IC indicated that the teacher engaged every student in conversation and that students' talk was the greater portion of total talk. However, the pattern of IC talk was uneven, with one student contributing 25% of the student talk and another barely participating at 4%. Students' language proficiency varied, as did their reticence to participate in their second language in a new situation.

It is common during the early phase of IC for teacher and students to converse about a broad range of topics, particularly individual experience and background knowledge. In this way, teachers develop a comfort zone that encourages all students to share. For language minority students, talk with peers and teacher means an opportunity to express language with native speakers of both the language of the home and the language of instruction. For teachers, student talk is a rich source of information about students' life experience and funds of knowledge, a basis for relationship, and an occasion for authentic assessment. In conversation, student talk reveals students' language proficiency in the languages of home and of instruction.

In early IC conversation, what appears to be divergent–even desultory–discussion is important preparation for scaffolding later conversation to intended IC themes. In the first IC, the teacher used a photograph from a familiar television series, "Star Trek," as a stimulus for students to talk about space, a topic used in the regular class. In the conversation, students moved the topic to talk about stars.

Edgar:	They have like holes in them. Like . . . [he moves his hands in a curved motion]
Teacher:	They have like holes in the planet. Holes in the planet, does anybody know what else we can call that?
Edgar:	Pozos. [Holes.] [Concha giggles.]
Edgar:	Shooting stars.
Teacher:	Shooting stars? Is that another name for the holes in the planet? Does anyone know what those . . .
Edgar:	Shooting stars are like stars, but they go shooo [hand gesture] really fast and when you see them, you can make a wish.

In this excerpt, the students participated comfortably in English, with one response in Spanish, giving the teacher a sense of their proficiency when conversing on a general topic. Following the direction of students' talk about stars, the teacher encouraged students' participation using prompts, restatements, and probes.

Luis:	The black hole.
Teacher:	Do you know what the black hole is? Can you explain that to everybody in the group?
Luis:	It is a round thing, and it has a lot of stars.
Teacher:	It is a round thing. [Turns and writes on board.] So you're saying that the black hole is something . . .
Concha:	I don't really care.
Teacher:	that is round [Luis and Concha laugh] and it has, what else did you say?
Luis:	Stars.

In this excerpt, the teacher pressed students to use language to express what they know, while ignoring an inappropriate response. Without interrupting the IC, she heard one student's attitude toward the topic. She and the other students modeled constructive social interaction that comprises appropriate IC talk. For students with little experience of conversation on an academic content topic, the ordinary conversational quality of early IC is familiar, attractive, and an occasion to model conversation conventions.

As the excerpts show, the students' conversation was at an everyday level and included an instance of Spanish language use. The students used incomplete utterances and gestures to convey meaning. The teacher demonstrated prompting, questioning, and restating student utterances. In the following excerpt, the teacher continues to probe students' background knowledge about planets and draws every student into participation in the conversation.

Teacher:	Yeah, and we also talked about some other characteristics. We talked about colors and sometimes some planets have rings around them, right?

Luis: Just Saturn has it, only Saturn? [He looks up at a poster.]
Teacher: I don't know, does only Saturn have a ring around it?
Daniel: Yeah.
Teacher: [to Daniel] Yeah?
Luis: They're all right there. Look. [Points up. Everyone is looking up at the wall poster.]
Edgar: Yeah, I think, huh?
Concha: Yeah, only Saturn.
Teacher: [to Concha] Only Saturn? [Concha nods.]

The teacher tracked the conversation by listing space and math-related terms or lexicon on a chart. The list became another visual aide for reviewing the course of conversation and for transitioning conversation to math topics–in this case, measurement.

Teacher: When we look up here, do we see any words, on our list that we made, that have to do with math?
Luis: Yeah.
Teacher: Like what?
Luis: Star Trek.
Concha: Saturn.
Teacher: Star Trek?
Luis: Like in the movies, like in ?
Teacher: What does that have to do with math?
Luis: Mmm, on the machines, the computers that they have on the Enterprise, like they measure stuff.
Teacher: They measure stuff? With their computers, okay. Yeah, so the computers on a starship would help you measure, like measure what? What sort of things?
Luis: Planets.

Using Luis's speculation about measuring planets, the teacher hooked onto a mathematics topic. Luis's answer, "planets," was an opportunity to bridge the conversation to measurement. By encouraging the students to talk and argue about the feasibility of measuring planets, a complex math problem, she discovered the students' varied opinions. In the following excerpt, a student suggests an activity relating to planet measurement.

Teacher: How do you measure a planet?
Edgar: You can't measure a planet.
Teacher: You can't?
[Edgar shakes his head.]
Daniel: Yeah.
Teacher: [to Edgar] No?
Luis: Yes, you can.
Daniel: You can.
Teacher: How can you?
Luis: You can draw a circle.
Edgar: You can't.
Teacher: You can draw a circle? Is that a way to measure a planet?
Luis: Yeah.
Teacher: Explain to me what you mean by that.
Luis: You draw a circle and then you like fold it.
Teacher: Uh-huh.
Luis: And you make a line in the middle.

Responding to the teacher's probes and the students' challenges, Luis produced a suggestion for a hands-on activity. Immediately, the teacher recognized the value of the activity for modeling the concepts of circumference and diameter. She used Luis's suggestion for the activity of the second IC.

The first IC yielded abundant information about students' language proficiency, content knowledge, and conversational skills. The majority of students participated competently at a general or everyday level, while one, Concha, was extremely reticent. The teacher accepted all student responses nonjudmentally, including inappropriate contributions, treating them as genuine attempts to contribute to conversation. The students appeared to have few math content concepts and used content lexicon infrequently.

Second IC Lesson

In the second IC, the teacher encouraged conversation around Luis's suggested hands-on activity. The IC opens with extended review discussion and then moves to a circle measurement activity using strings and jar lids. The teacher and students spend most of the lesson in the joint activity, which culminates with students pasting their circumference and diameter strings to a chart. The activity is punctuated by students' logistical problems pasting their strings to the chart, non-academic talk, and interruptions from outside the IC group. The students' inappropriate level of talk is high at 62%.

The TPOT decreased by 10 percentage points, to 33%, while the SPOT increased to 67%. The students' use of content lexicon in this IC almost tripled, from 6 to 22 terms. The teacher focused her talk on the activity, ignoring inappropriate talk and

behavior. She modeled content lexicon at more than twice the rate of the first IC, from 28 to 72. The following example shows the teacher modeling and labeling, and one student using content lexicon.

Edgar:	This is my long, my circle one and this is my half one. [Adrianna is facing the camera and showing a piece of paper.]
Teacher:	Okay, this is your circumference line. [Runs finger up the string.]
Edgar:	Yeah.
Teacher:	The long one? And this is your diameter line?
Edgar:	[Nodding] Diameter.

As in this excerpt, students required assistance to use content lexicon, and their language expression was mostly limited to one word or incomplete utterances. This is not unexpected if the previous classroom experience of these students as described by their regular teacher is considered. These students were assigned to the back of the room, given worksheets to complete in isolation, and labeled as "unteachable" and "lepers" by the teacher. These students had little experience to bring to the open-ended, problem-solving give-and-take of IC.

Third IC lesson

The third IC lesson was also activity based. The teacher used the product of joint activity, a string chart, as the stimulus for conversation. In the third IC, teacher percentage of talk increased from 33% in the second lesson to 38%, and students' individual participation ranged from 4% to 18%. In the third IC, student talk is appropriate more than 70% of the time.

The third IC began with a review of the previous lesson's activity and the concepts it represented. The conversation continued to be characterized by inappropriate utterances but at a much lower level than in the second IC. In the following example, the teacher's tone and delivery in response to student talk is courteous and accepting, modeling the value she places on all students' contributions. Even so, she maintains topic focus in the face of inappropriate student responses. Note the students' rapid return to the topic in the example with Adrianna that follows.

Teacher:	The last time we were together?
Adrianna:	Son hilitos [explaining to Adam that they are small pieces of strings].
Adam:	What?
Adrianna:	Ah, shut up.
Teacher:	No, please explain it.
Daniel:	You have like a round thing and then you have to measure around it, and then across.
Adrianna:	You have to measure around and then . . .
Teacher:	And what was the thing [motioning with finger] around? What was it called?
Luis:	Circumference.
Adrianna:	Le tienes que dar vueltitas. [You have to make the string go around in circles.]

Often, the students assisted one another to understand by translating into Spanish. The teacher provided a high level of assistance, as in the following example. The assistance was producing success for Luis.

Teacher:	What do these strings represent?
Luis:	The circle.
Teacher:	The circle, how does it represent the circle?
Luis:	This is around and this is across.
Teacher:	And this one around, this is the . . .? [Traces the string with her finger.]
Luis:	Circumference.
Teacher:	Yes, and that's the . . .? [Points to the string on paper.]
Luis:	Diameter.
Teacher:	All right!

The success encouraged the teacher to take advantage of the cooperative participation structures to attempt more scaffolding. In the following excerpt, she shifted interaction to assist emerging understanding in Adrianna's zone of proximal development.

Teacher:	I asked her, I said, how do you know if we measure Saturn and Jupiter, how can we tell which one's bigger and what did you say?
Adrianna:	You measure the diameter.
Teacher:	Uh-huh, uh-huh, you measure the diameter of which one?
Adrianna:	Of both.
Teacher:	Of both and then what did you do?
Adrianna:	You see which one's bigger than which one.
Teacher:	So you compared the diameters of the two?
Adrianna:	Yeah.
Teacher:	And you told me that if you knew the size of the diameter, that you could know the size of the circumference. How did you

know? Why is that? Why do you think that?

Adrianna: Well, because the one string's gonna be bigger than the other.

The teacher succeeded in engaging Adrianna for five turns, an experience of considerable concentration in English for this student. Granted, Adrianna's articulation of the relationship of circumference and diameter is minimal, but her willingness to express her understanding in English evidenced increased engagement with the topic. In this example, the student's success was her willingness to participate as much as she did in academic conversation in English.

In another example, Daniel uses one word from the lexicon, *circumference*, but not another, *diameter*. The teacher constructs a scaffold from what she judges Daniel knows about the concepts' relationship–that diameter is smaller–to assist his understanding about the meaning of the concepts' relationship, known as *pi*. In the following excerpt, she shifts the interaction to attempt to activate learning in Daniel's ZPD by (1) eliciting increasingly precise language to articulate his meaning, (2) validating his understanding, and (3) prompting him to express his rationale.

Daniel: This is the conconference, or whatever.

Teacher: So this one's the circumference, and this one is the diameter?

Daniel: I just remember that the diameter is the smallest, small, smaller than this one [referring to circumference string].

Teacher: Well, which string did you measure around the edges with?

Daniel: This one [pointing to the circumference string].

Teacher: This one? The circumference?

Daniel: Yeah, and this one across it.

Teacher: Across it? So why do you think that this is smaller than this–that the diameter is smaller than the circumference? Why do you think that happens?

Daniel: Because if this one shrinks, like she said, it will shrink down, this one's still going to be smaller than that one.

Teacher: Why? What would happen, what would happen to this, the diameter?

Daniel: That one stays smaller. It will get smaller.

Daniel articulated a clear sense of the relationship of the concepts, a basis for understanding the complex concept, pi. This example of IC assistance informs the teacher's judgment about Daniel's ZPD, revealing the extent of his independence with the concepts. With this information, she can assist Daniel on the next occasion. For Daniel and Adrianna, the number of talk turns on the academic topic and the willingness to use language to express complex mathematics relationships was impressive. Following this, the IC moved into a planet–measuring activity requiring application of these concepts.

The teacher encouraged the students to converse by encouraging peer models and by exhibiting interest in their answers. She welcomed any level of appropriate response, and she was interested in every student's participation as validation that they understood the conversation and could use the lexicon. As a result, the students used more than two times the content lexicon they used in the second lesson, from 22 to 49, and eight times their use in the first, from 6 to 49. Students' level of appropriate utterances increased from 38% to 73%–almost double the rate of the second IC.

In summary, conversation focused on visual stimuli and student experience in the first IC, on joint productive activity in the second IC, and on the lexicon and concepts represented by the joint activity in the third IC. Students' participation improved from the first to the third IC for appropriate responses and more use of content lexicon–8 times the number used in the first IC. This is evidence supporting increased facility with content lexicon. The students continued to require assistance from the teacher and supported one another to produce constructive responses in conversation.

Cazden (1986) discussed the difficulty in distinguishing sociocultural and conceptual functions of language. The points of view of the speakers, particularly those of language minority students, may be unclear due to cultural differences as well as limited language proficiency. In the IC excerpts presented here, the students' increased use of math

lexicon attests to their developing proficiency with the English terms. It is also clear that they are more willing to engage with the teacher and one another on math topics in English for longer duration–a change from the earlier ICs. In a sociocultural sense, the language use strongly suggests that students' points of view have shifted from those of an excluded outsider to those of the included member, the math student. In assuming this new role, the students' opportunity to grasp the conceptual function of language is dramatically enhanced. In the fourth IC, the students' lexicon use remains at the same high level of use, suggesting a stabilizing effect.

Fourth IC Lesson

The quantitative results reported previously clearly suggest a difference in the fourth IC lesson from the previous IC lessons. The quantitative analyses show teacher and students' percentage of talk (TSPOT) and student use of content lexicon have leveled off, while students' appropriate responses increased to almost 100%. This attests to a sustained focus in the conversation and an increased competence for IC among the group members. What are the ways in which students participated in the fourth IC that contrast with the previous ICs? And what ways did students use context lexicon that suggested they understood the terms and the concepts they represented? This discussion will examine, through examples of students' and teacher's conversation, ways the IC was inclusive and student enhancing, maintained students' high level production of content lexicon, and assisted students' understanding of math concepts.

The IC began with review questions asking students to recall what they remembered about measuring the circumference of a circle.

Teacher:	Okay, wow, we haven't been together for a long time, huh? It's been an entire week. Who wants to talk about what we have done? Let's see what you remember about what we have done. It's been a long time.
Daniel:	That thing that you measure, the thing around the . . .
Teacher:	The thing, what do you mean when you say this thing?
Concha:	The circumference.
Teacher:	The circumference. [Writes "circumference" on board.]
Daniel:	Yeah, and you measure the diameter, too.

Daniel and Concha, eager to participate from the beginning of this IC, were the most reticent students in the first lesson. Responding to the teacher's prompts as the review discussion continues, all students participate. This IC contrasts with previous ICs in the high level of student responses coded "appropriate," that is, on the IC topic. This strongly indicates their understanding of the purpose of the conversation and its relationship to the string chart. Students spontaneously use content lexicon to answer questions about the chart. Concha's reticence persists, but her whispered use of content vocabulary in the following example suggests her growing confidence.

Teacher:	And so that was . . . do you remember when, what about this? Somebody tell me about this? Do you remember all that we learned from these?
Daniel:	Yeah.
Concha:	[whispers] The circumference.
Luis:	The circumference and the diameter.

Continuing to refer to the string chart, the teacher encouraged the students to use the lexicon to talk about the meaning of the concepts. In the following example, the students accurately labeled and one student initiated an explanation using complex language.

Teacher:	Right. Okay, so, which one was the diameter? Can you guys tell me which?
All:	The smallest ones.
Teacher:	How do you know it's the smallest one?
Daniel:	Because the diameter is always going to be smaller than the, the circumference.

In the second line, the students' choral response indicates that they agree. All conversation relates to the meaning and relationship of the circumference and diameter strings attached to the chart.

Luis:	Well, like this one is three times bigger.
Teacher:	Yes.
Luis:	This is three times smaller.
Teacher:	Yes! Is it exactly three?
Edgar:	No.
Teacher:	No, why? What is it?
Edgar:	This one side will be longer. It could be . . .
Daniel:	Almost.
Edgar:	It could be two.
Luis:	Like this one. It will always be like this one. [Points to chart.] And this one it will be three times.
Edgar:	This one will be three.
Teacher:	And that one will be three?
Luis:	All of them will be . . .
Teacher:	So, all of them will be, all of the what will be?
All:	All these diameters will be three times the circumference.

Edgar, Daniel, and Luis co-narrated a joint response about the relationship of diameter and circumference. The students built upon one another's responses over five turns. They succeeded in expressing a relationship between concepts, although they confuse the lexicon. Even so, the teacher senses that the conversation has scaffolded students' understanding about the relationship between diameter and circumference. This excerpt shows the students have broken completely with a recitative or one-on-one type of response to teacher questions and engage the topic as a group, assisting, supporting, and responding to one another to produce an answer. One student was not participating in the co-narration. Concha explains:

Concha:	I can't remember anything.
Teacher:	You can't remember, that's okay. That's why we are reviewing. Now, do you know what it means when it's that three? What was (your regular classroom teacher) just talking about?
Daniel:	Circles.
Concha:	Circles and squares, circumference.
Edgar:	Circumference.
Daniel:	Degrees and all that.

As the excerpt shows, the teacher responded immediately to Concha's feelings of exclusion and failure. Note that she reviewed the purpose of the conversation briefly with her and then assisted Concha's return to the conversation by addressing questions to her. The teacher's attention to Concha was direct and swift, leaving the flow of the conversation undisturbed. The lack of disturbance was evidenced in the way the group continued IC. Daniel answered questions addressed to Concha, as did Edgar. Concha's subsequent appropriate contributions indicate she returned successfully to the lesson conversation.

Certainly, the teacher was skillful in maintaining the flow of the conversation while dealing with a single student's difficulties. However, the students' unbroken focus on the content topic supports the notion that a group identity and shared purpose were present. The students' choice to stay engaged in IC reflects the group's common interest in the content topic. Mutual assistance and cooperation for learning purposes increasingly characterized this IC. Attesting to this, Concha was able to provide assistance to another student slightly later, as the following excerpt shows.

Teacher:	Do you guys want to mark the middle?
Daniel:	Hey, my middle come out crooked.
Teacher:	Did you, when you . . .
Concha:	Did you fold it twice?
Daniel:	No, I didn't fold it twice.
Concha:	Alright, so that's it.

Concha's assistance was accepted by Daniel. Expressing her own confusion in the earlier example did not reduce her self-confidence or status in the IC group, nor did it interrupt the momentum of the conversation or activity. The students reaped the benefits of cooperation and shared perspective conferred by emerging intersubjectivity.

The benefits extended to the substantive topic of IC as well. By conversing about concepts represented in the joint activity of the IC, students gained the confidence and knowledge to use content lexicon. As the teacher used the IC pedagogy to scaffold students' math conversation, the students demonstrated their capacity to achieve more complex understandings of concepts. In the following excerpt, the student expressed his understanding about the constant relationship between diameter and circumference, or pi.

Teacher:	How do you know it's (the diameter string) the smallest one?
Daniel:	Because the diameter is always going to be smaller than the, the circumference.

In summary, the teacher's high expectations for every student and her belief that she could assist them to complex thinking about math concepts were clear and enacted in IC. With intersubjectivity established in the group, the context was available for cooperation and affirmation, the comity of conversation, and teaching and learning. The teacher was able to assist these students in problem solving and other higher order thinking not only because she believed she could but as a product of her relationship with the students, their developing experience in conversation, and competence with math lexicon and concepts.

SUMMARY

In these mathematics ICs, there is convincing evidence that the teacher created an inclusive and student-enhancing learning context, and, within that context, students increased their production and acquisition of content lexicon in the language of instruction. The teacher maintained stable student/teacher talk ratios (TSPOT) across the lessons, indicating that she conversed in ways that elicited student contributions and supported students' language expression.

In the first IC, the reticence of all but one of the students to participate in the language of instruction was clear. In the second, students' participation was high on inappropriate topics, indicating their increased willingness to talk in the context. This suggests that the students used language for its sociocultural function in their roles as peer group members and less so as math students. In the third IC, the teacher continued to build rapport, encourage student participation, and gain topic focus. The students contributed oppropriate talk at twice the proportion of the second IC, suggesting they were enacting the role of math students with increased confidence. The third IC strongly indicated that students used language to express growing conceptual understanding. The dramatic rise in appropriate talk in the fourth IC, combined with a stabilized high level of lexicon use, attests to students' growing competence in IC using math lexicon and concepts.

Several events indicated that the teacher and students experienced intersubjectivity, a condition of group cooperation and shared interpretations. For example, in the experience of Concha, it is unlikely that she would have overcome her frustration and chosen to accept the teacher's assistance without the conditions of intersubjectivity present in the group. With intersubjectivity established, the context was available for cooperation and affirmation and, importantly, for teaching and learning. In another example, Luis, a competent student, modified his participation in the the ICs by reducing it to roughly a third. His contribution to the balance of turns in the ICs indicated his increasing understanding of conversation and the value of participation that is listening, assisting others, and participating in joint activity. This suggests that, in IC, the teacher created a supportive context for promoting student language expression for affective as well as cognitive needs.

These ICs demonstrate that substantial change occurred in students' use of content lexicon and appropriate responses, revealing changes in students' knowledge base. It is indisputable that the students conversed more about circles and circle measurement and used more content lexicon at the end of the fourth IC than they did at the beginning of the first IC. The high level of appropriate responses in the third and fourth ICs strongly indicates that students' growing interest in participating was motivated by an increase in their experience of competence. The incentive to some degree resides in the group condition of intersubjectivity and sense of belonging it conferred. Students' use of content lexicon at the levels achieved strongly suggests that, in IC, they were using language for its sociocultural, role-defining, and conceptual functions.

IMPLICATIONS

The emergent intersubjectivity in the conversations was built on students' and teacher's similar and

shared experience in constructive social interaction about math. As a result, mutual assistance and cooperation for assistance among teacher and students occurred. It is an interesting question whether assistance of any sort can be provided without a corresponding condition of intersubjectivity. This teacher's success in creating a context characterized by academic conversation and intersubjectivity demonstrates the usefulness of IC for assisting students' academic English language production.

Although the contact time for the teacher and students in these IC lessons was limited to four brief lessons interspersed over many weeks, there is evidence that the IC created new conditions for these students to participate in knowledge-constructing conversation. The students clearly showed an increased use of content lexicon, an increase in group focus on an academic topic, and a developing condition of intersubjectivity. The teacher and students came to share a perspective for their work together, understanding much more about how to talk together about math and what words to use to converse on an academic topic.

TIPS FOR TEACHERS PLANNING IC

Instructional Conversation (IC) reflects a plan that is outcomes-based. An infrastructure supports IC as shown in the following diagram.

INSTRUCTIONAL <> CONVERSATION

OUTCOMES-BASED <> INCLUSIVE

ASSESSMENT <> RESPONSIVE

ASSISTANCE <> JOINT PARTICIPATION

CO-CONSTRUCTED KNOWLEDGE

Planning IC really means having a conversation with yourself. The following set of questions is a guide for planning an IC based on the features diagramed above. It is important to consider local conditions and student characteristics when planning and enacting IC. ICs can be any length depending on outcomes intended and opportunity to interact.

Outcomes Based

1. What do I want to hear my students say after IC that will show they understand concepts or other instructional intent?

2. What do my students' already know about participating in conversation on an everyday topic? On an academic topic? Is there a difference?

3. Based on what my students know, what is the instructional intent of the IC? (Early in the academic year, IC focuses on general topics that build relationships, rapport, and negotiate conversational conventions for IC, such as students speaking without raising their hands to encourage joint participation. Later, IC targets learning objectives.)

4. What topics relate to IC instructional intent? What is the topic to introduce first?

Inclusive

5. Select a stimulus for beginning IC that encourages every student to talk about experience or background knowledge generally related to IC intent and topics. (The stimulus can be the same as the activity described in Question 9, particularly when teacher and students have established rapport.)

Assessment

6. Formulate questions that will encourage students to talk about themselves and the IC topic (e.g., Have you ever seen or felt or talked about or heard this before? Tell us more about that. What else do you know about this? How did you like it, feel about it, respond to it? What do you think this might have to do with what we are going to talk about? How do you know? Tell me more.).

Responsive

7. List the most likely initial student responses to the IC topic. (IC planning is most successful when it anticipates various outcomes, including some unexpected ones, in the interaction. This is the key to teacher responsiveness in IC.)

8. What will my responses be to those I listed for the students in Question 7?

9. Given the student responses I can forecast, what will assist students to understand the IC instructional topic? (Teachers use manipulatives, illustrations, semantic webs, structured overviews, charts, writing, games, textbooks, tradebooks, student models, and student suggestions.)

Assistance

10. Prepare questions and prompts to find out what students are thinking about the meaning of the activity. Teachers ask open-ended "how" questions to encourage students to talk, including questions about how students feel about the activity. They ask students to restate, summarize, and justify their remarks based on their experience in the activity.

Joint Participation

11. How will the group interact? Will they raise their hands to talk? Will they wait quietly for each other to finish their statements? How will the group decide how to converse? (Sometimes teachers model conversation about school topics with students for the whole class and have a follow-up discussion about how it went. Others get started, and through participation in IC negotiate the ways the group is comfortable conversing.)

Co-constructed Knowledge

12. What do I know now about my students understanding of the IC topic? Can they use the ideas and other information on their own? Are they confident about themselves as students in the content area of the IC?

REFERENCES

Allington, R. (1990). Children who find learning to read difficult: School responses to diversity. In E.H. Hiebert (Ed.), *Literacy for a diverse society: Perspectives, programs, and policies* (237-252). Bristol, PA: Palmer.

Au, K. (1980). Participation structures in a reading lesson with Hawaiian children: Analysis of a culturally appropriate instructional event. *Anthropology and Education Quarterly, 11*(2), 91-115.

Cazden, C. (1986). Classroom discourse. In M. S. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed.). New York: Macmillan.

Cazden, C. (1988) *Classroom discourse.* Portsmouth, NH: Heinemann.

Chamot, A.U. (1992). Learning and problem solving strategies of ESL students. *Bilingual Research Journal, 16*(3&4), 3-27.

Chamot, A. U., Dale, M., O'Malley, J. M., & Spanos, G. A. (1992). Learning and problem solving strategies of ESL students. *Bilingual Research Journal, 16* (3 & 4), 1-29.

Chamot, A. U., & O'Malley, J. M. (1989). The cognitive academic language learning approach. In P. Rigg & V. G. Allen (Eds.), *When they don't all speak English: Integrating the ESL student into the regular classroom* (pp. 108-125). Urbana, IL: National Council of Teachers of English.

Collier, V.P. (1987). *Age and rate of acquisition of cognitive-academic second language proficiency.* Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.

Duran, R., Revlin, R., & Havill, D. (in press). *Verbal comprehension and reasoning skills of Latino high school students.* Santa Cruz, CA and Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning.

Erickson, F. (1986). Qualitative methods in research on teaching. In M. Wittrock (Ed.), *Handbook of research on teaching* (pp. 119-161). New York: MacMillan.

Gallimore, R., Dalton, S., & Tharp, R. G. (1986). Self-regulation and interactive teaching: The impact of teaching conditions on teachers' cognitive activity. *Elementary School Journal, 86*(5), 613-631.

Goldenberg, C. (1993) Instructional Conversations: Promoting comprehension through discussion. *The Reading Teacher, 46,* 316-326.

Henderson, R. (1992). *Mathematics and middle school students of Mexican descent: The effects of thematically integrated instruction* (Research Rep. No. 5). Santa Cruz, CA and Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning.

Means, B., & Knapp, M.S. (1991). Models for teaching advanced skills to educationally disadvantaged children. In *Teaching advanced skills to educationally disadvantaged children.* Washington: U.S. Department of Education, Office of Planning.

Mohatt, G., & Erickson, F. (1980). Cultural differences in teaching styles in an Odawa school: A sociolinguistic approach. In H.T. Trueba, G.P. Guthrie, & K. Au (Eds.), *Culture and the bilingual classroom: Studies in classroom ethnography* (pp.105-119). Rowley, MA: Newbury House.

Padron, Y.N. (1992). The effect of strategy instruction on bilingual students' cognitive strategy use in reading. *Bilingual Research Journal, 16*(3&4), 35-51.

Palinscar, A., & Brown, A. (1984). Reciprocal teaching of comprehension-fostering and comprehension monitoring activities. *Cognition and Instruction, 1,* 117-175.

Polya, G. (1973). *Induction and analogy in mathematics.* Princeton, NJ: Princeton University Press.

Ramirez, J. D., Yuen, S. D., & Ramey, D. R. (1991). *Longitudinal study of structured English immersion strategy, early-exit and late-exit transitional bilingual education programs for language-minority children. Final report to the U.S. Department of Education.* San Mateo, CA: Aguirre International.

Raphael, T., & Pearson, P.D. (1985). Increasing students'awareness of sources of information

for answering questions. American Educational Research Journal, 22, 217-235.

Rosebery, A.S., Warren, B., & Conant, F. (1992) *Appropriating scientific discourse: Findings from language minority classrooms* (Research Rep. No. 3). Santa Cruz, CA and Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning.

Rueda, R., & Garcia, E. (1994). *Teachers' beliefs about reading assessment with Latino language minority students* (Research Rep. No. 9). Santa Cruz, CA and Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning.

Rueda, R., Goldenberg, C., & Gallimore R. (1992). *Rating instructional conversation: A guide* (Educational Practice Rep. No. 4). Santa Cruz, CA and Washington, DC: National Center for Research on Cultural Diversity and Second Language Learning.

Secada, W.G. (1991). Student diversity and mathematics education reform. In L. Idol & B.F. Jones (Eds.), *Educational values and cognitive instruction: Implications for reform* (pp. 297-332). Hillsdale, NJ: Lawrence Erlbaum.

Silver, E. A., & Marshall, S.P. (1990). Mathematical and scientific problem solving: Findings, issues, and instructional implications. In B.F. Jones & L. Idol (Eds.), *Dimensions of thinking and cognitive instructions* (pp. 265-290). Hillsdale, NJ: Laurence Erlbaum.

Spanos, G. (1990). On the integration of language and content instruction. *Annual Review of Applied Linguistics, 10,* 227-240.

Tharp, R., & Gallimore, R. (1989). *Rousing minds to life.* New York: Cambridge University Press.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds. and Trans). Cambridge, MA: Harvard University.

OTHER REPORTS FROM NCRCDSLL

RESEARCH REPORTS

RR 1 *Sociological Foundations Supporting the Study of Cultural Diversity* (1991), Hugh Mehan

RR 2 *The Instructional Conversation: Teaching and Learning in Social Activity* (1991), Roland G. Tharp & Ronald Gallimore

RR 3 *Appropriating Scientific Discourse: Findings from Language Minority Classrooms* (1992), Ann S. Rosebery, Beth Warren & Faith R. Conant

RR 4 *Untracking and College Enrollment* (1992), Hugh Mehan, Amanda Datnow, Elizabeth Bratton, Claudia Tellez, Diane Friedlaender & Thuy Ngo

RR 5 *Mathematics and Middle School Students of Mexican Descent: The Effects of Thematically Integrated Instruction* (1992) Ronald W. Henderson & Edward M. Landesman

RR 6 *Moving In and Out of Bilingualism: Investigating Native Language Maintenance and Shift in Mexican-Descent Children* (1993), Lucinda Pease-Alvarez

RR 7 *Two-Way Bilingual Education: A Progress Report on the Amigos Program* (1993), Mary Cazabon, Wallace E. Lambert & Geoff Hall

RR 8 *Literacy Practices in Two Korean-American Communities* (1993), Robin Scarcella & Kusup Chin

RR 9 *Teachers' Beliefs about Reading Assessment with Latino Language Minority Students* (1994), Robert Rueda & Erminda Garcia

RR 10 *Tracking Untracking: The Consequences of Placing Low Track Students in High Track Classes* (1994), Hugh Mehan, Lea Hubbard, Angela Lintz, & Irene Villanueva

RR 11 *Students' Views of the Amigos Program* (1994), Wallace E. Lambert & Mary Cazabon

RR 12 *Enacting Instructional Conversation with Spanish-Speaking Students in Middle School Mathematics* (1995), Stephanie Dalton & June Sison

RR 13 *"This Question Is Just Too, Too Easy!" Perspectives From the Classroom on Accountability in Science* (1995), Beth Warren & Ann S. Rosebery

RR 14 *Verbal Comprehension and Reasoning Skills of Latino High School Students* (1995), Richard Durán, Russell Revlin & Dale Havill

EDUCATIONAL PRACTICE REPORTS

EPR 1 *The Education of Linguistically and Culturally Diverse Students: Effective Instructional Practices* (1991), Eugene E. García

EPR 2 *Instructional Conversations and Their Classroom Application* (1991), Claude Goldenberg

EPR 3 *Language Minority Education in the United States: Implications of the Ramirez Report* (1992), Courtney B. Cazden

EPR 4 *Rating Instructional Conversations: A Guide* (1992), Robert Rueda, Claude Goldenberg & Ronald Gallimore

EPR 5 *Myths and Misconceptions about Second Language Learning: What Every Teacher Needs to Unlearn* (1992), Barry McLaughlin

EPR 6 *Teacher Research on Funds of Knowledge: Learning from Households* (1993), Norma González, Luis C. Moll, Martha Floyd-Tenery, Anna Rivera, Patricia Rendón, Raquel Gonzales, & Cathy Amanti

EPR 7 *Instructional Conversations in Special Education Settings: Issues and Accommodations* (1993), Jana Echevarria & Renee McDonough

EPR 8 *Integrating Language and Culture in Middle School American History Classes* (1993), Deborah J. Short

EPR 9 *Links Between Home and School Among Low-Income Mexican-American and European-American Families* (1994), Margarita Azmitia, Catherine R. Cooper, Eugene E. Garcia, Angela Ittel, Bonnie Johanson, Edward M. Lopez,Rebeca Martínez-Chávez, & Lourdes Rivera

EPR 10 *Effective Instructional Conversation in Native American Classrooms* (1994), Roland G. Tharp & Lois A. Yamauchi

EPR 11 *Integrating Language and Content: Lessons from Immersion* (1994), Fred Genesee

EPR 12 *Two-Way Bilingual Education: Students Learning Through Two Languages* (1994), Donna Christian

EPR 13 *Making Change Happen in a Language Minority School: A Search for Coherence* (1994), Claude Goldenberg & Jessie Sullivan

Video Series

MEETING THE CHALLENGE OF TEACHING LINGUISTICALLY DIVERSE STUDENTS
($40.00 FOR EACH VIDEO)

#1 *Profile of Effective Bilingual Teaching: Kindergarten* (1995), Jon Silver

#2 *Profile of Effective Bilingual Teaching: First Grade* (1995), Jon Silver

#3 *Instructional Conversations: Understanding Through Discussion* (1995), Jana Echevarria

Ordering Information

TO ORDER COPIES OF RESEARCH REPORTS AND EDUCATIONAL PRACTICE REPORTS, PLEASE CONTACT:

Dissemination Coordinator
National Center for Research on Cultural Diversity
and Second Language Learning
Center for Applied Linguistics
1118 22nd Street N.W.
Washington, D.C. 20037
202-429-9292

THE NATIONAL CENTER FOR
RESEARCH ON
CULTURAL DIVERSITY AND
SECOND LANGUAGE LEARNING
141 KERR HALL
UNIVERSITY OF CALIFORNIA
SANTA CRUZ, CA 95064
PHONE: (408) 459-3500
FAX: (408) 459-3502

recycled paper